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| APPLICATION NO. | FILING DATE | FIRST NAMED INVENTOR | ATTORNEY DOCKET NO. | CONFIRMATION NO. |
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| 10/529,487 | 03/28/2005 | Shinichi Musha | 8007-1090 | 7924 |

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| EXAMINER | |
|---|---|
| ALEJANDRO, RAYMOND | |
| ART UNIT | PAPER NUMBER |
| 1795 | |

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**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

| Office Action Summary | Application No. | Applicant(s) | |
|---|---|---|---|
| | 10/529,487 | MUSHA ET AL. | |
| | Examiner | Art Unit | |
| | Raymond Alejandro | 1795 | |

*-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --*

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

1)☒ Responsive to communication(s) filed on *01 December 2008*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

4)☒ Claim(s) *1-31* is/are pending in the application.

4a) Of the above claim(s) *9-13 and 28-30* is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-8,14-27 and 31* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

**Application Papers**

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *28 March 2005* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☒ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date *See Continuation Sheet*.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

Continuation of Attachment(s) 3). Information Disclosure Statement(s) (PTO/SB/08), Paper No(s)/Mail Date :03/28/05, 06/07/05, 04/11/06, 11/09/06, 03/09/07, 07/03/07, 09/10/07 .

## DETAILED ACTION

### *Election/Restrictions*

1. Applicant's election with traverse of Group I and Species B and sub-species 1 (claims 1-2, 4 and 5-8) in the replies filed on 10/20/08 and 12/01/08 is acknowledged.

With particular respect to the restriction between Group I and II, it is noted that because applicant did not distinctly and specifically point out the supposed errors in the restriction requirement, the election has been treated as an election without traverse (MPEP § 818.03(a)).

With particular respect to the election of species, applicant's traversal that at least claims 3, 6-7, 14-27 and 31 are also readable on elected species B as they were not identified as belongings to a particular species has been found persuasive, and thus, these claims have been rejoined and examined on their merits.

With particular respect to the election of species as applied to claims 8-13, it is noted because applicant did not distinctly and specifically point out the supposed errors in the restriction requirement, the election has been treated as an election without traverse (MPEP § 818.03(a)). Applicant did not specifically traverse or point out the supposed errors in the election of species as applied to claims 8-13.

As such, the requirement is still deemed proper and is therefore made FINAL.

### *Priority*

2. Acknowledgment is made of applicant's claim for foreign priority under 35 U.S.C. 119(a)-(d). Receipt is acknowledged of papers submitted under 35 U.S.C. 119(a)-(d), which papers have been placed of record in the file.

### *Information Disclosure Statement*

3. The information disclosure statements (IDS) submitted on 03/28/05, 06/07/05, 04/11/06, 11/09/06, 03/09/07, 07/03/07, and 09/10/07 were considered by the examiner.

### *Drawings*

4. The drawings were received on 03/28/05. These drawings are acceptable.

### *Specification*

5. The preliminary amendment filed 03/28/05 does not introduce new matter into the disclosure.

6. Applicant is reminded of the proper language and format for an abstract of the disclosure.

The abstract should be in narrative form and generally limited to a single paragraph on a separate sheet within the range of 50 to 150 words. It is important that the abstract not exceed 150 words in length since the space provided for the abstract on the computer tape used by the printer is limited. The form and legal phraseology often used in patent claims, such as "means" and "said," should be avoided. The abstract should describe the disclosure sufficiently to assist readers in deciding whether there is a need for consulting the full patent text for details.

The language should be clear and concise and should not repeat information given in the title. *It should avoid using phrases which can be implied, such as, "The disclosure concerns," "The disclosure defined by this invention," "The disclosure describes," "Disclosed is" etc.*

### *Claim Rejections - 35 USC § 112*

7. The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

8. Claims 1-8, 14-27 and 31 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

9. The language "low capability" and "high capability" in claim 1, lines 4 and 8 is a relative term which renders the claim indefinite. The terms "low" and "high" are not defined by the claim, the specification does not provide a standard for ascertaining the requisite degree, and one of ordinary skill in the art would not be reasonably apprised of the scope of the invention. The extent or degree of the terms "low" and "high" are unknown.

10. Claim 4 recites the limitation "an electro-conductive carbon material" in line 4. There is insufficient antecedent basis for this limitation in the claim. Even though claim 1 recites "an electro-conductive material" (not exactly "an electro-conductive carbon material") it is immediately unclear to the examiner whether the foregoing limitation is intended to recite another electro-conductive material or the same of claim 1.

11. The language "a maximum particle size of 50 μm or smaller" in claim 14 is of uncertain meaning, thereby rendering the scope of the claim vague. The term "maximum" in combination with a particular size range (50 μm or smaller) does not provide a standard for ascertaining the requisite degree, and one of ordinary skill in the art would not be reasonably apprised of the scope of the invention. Note that a "*maximum*" value should be represented by an upper value per se, not by a range of values.

12. Claim 15 recites the limitation "the outermost surface" in line 6. There is insufficient antecedent basis for this limitation in the claim.

13. The language "*the outermost surface of the active material particles having a silicon concentration of higher than half of an oxygen concentration of the outermost surface*" in claim 15 is of uncertain meaning, thereby rendering the scope of the claim vague. It is unclear as to what specific "outermost surface(s)" (with respect to particular sides or spatial orientation, and materials) applicant is intending to recite.

14. The language "*wherein the current collector is formed of punching metal or expanded metal, each having a large number of openings each having an opening area of 0.0001 to 4 $mm^2$ or metal foam*" in claim 26 is of uncertain meaning, thereby rendering the scope of the claim vague. The examiner does not understand the specific scope of claim in the context of the claimed limitation. To the extent such a claim was understood by the examiner, it appears that applicant intends to claim a "*punching metal or expanded metal with specific opening characteristics, **or** metal foam*". Further clarification is required.

## *Claim Rejections - 35 USC § 102*

15. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

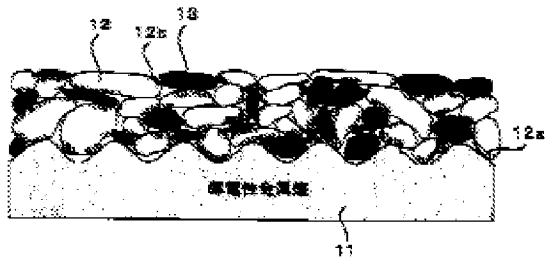
16. Claims 1-8, 14-20, 22-24, 27 and 31 are rejected under 35 U.S.C. 102(b) as being anticipated by the Japanese publication JP 2002-260637 (herein called the JP'637).

As to claims 1-3, 8 and 31:

The JP'637 discloses a lithium secondary cell having a negative electrode comprising a current collector and, formed on the surface thereof, a layer of a mixture of active material particles containing silicon or silicon alloy, and a powder of an electro-conductive metal such as cupper, wherein the powder of an electro-conductive metal is mixed in an amount of 50 wt % or less (P0019, 0023-0024, 0040-0048, 0062-0064 and 0078, and Abstract). Table 3 between paragraphs 0064-0065 shows the content of the electro-conductive material, particular amounts of 11.1 %, and 20 %, 33.3 %, and 50 % are reported (Table 3). The non-aqueous nature of the battery is discussed in paragraphs 0035-0036.

**Figure 2** of the JP'637 illustrates the layered structure of the negative electrode comprising layers of different materials 12, 12a, 12b and 13 including, among others, the active material and the electro-conductive material:

【図２】



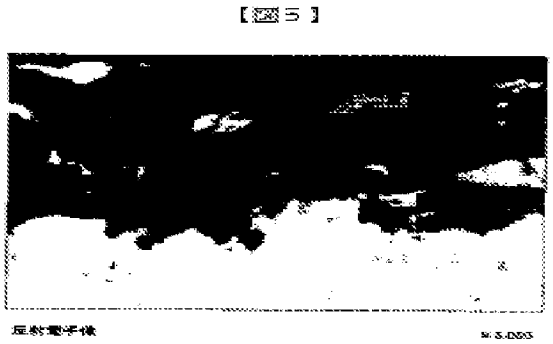

As to claim 4:

Table 3 between paragraphs 0064-0065 shows the content of the electro-conductive material, particular amounts of 11.1 %, and 20 % are reported (Table 3).

As to claims 5-7:

FIGURE 2 above shows the nature of the layered structure of the negative electrode comprising layers of different materials 12, 12a, 12b and 13. It is useful to note that all layer

materials reach or touch the current collector 11 (See FIGURE 2); and that materials 12, 12a, 12b and 13 are dispersed through the surface of the current collector, thus, they all penetrate through each other, and since the nature of those materials include at least a powdery material, it can be said that the powdery material itself comprises certain degree of porosity (FIGURE 2 and 5).



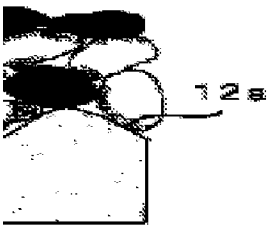
As to claim 14-15 and 22-24:

JP'637 discloses particle sizes and thicknesses of the electrode active materials including 10 μm, 50 μm, 100 μm (0024, 0027, 0040, 0049, 0053); and 20 μm (P0042). Additionally, TABLE 4 also illustrates dimensional magnitudes including 50 μm or 3μm, and 15 μm or 3 μm (See TABLE 4). The specific oxygen concentration is considered to be an inherent property or characteristic of layered structure of the negative electrode according to the exposure of oxygen. *Note that the present claim does not recite that oxygen atoms are combined with silicon or any other active material.*

As to claim 16:

The current collector of the JP'637 does include copper (Abstract). *Thus, it is contended that at the interface between the current collector made of copper and the active material layers, there is an interfacing coating layer containing at least copper due to the chemical interaction taking place at that location. Note that the present claim does not require that the at least one*

*element be uniformly mixed or blended with the coating layer. Thus, it is not unreasonable to conclude that certain amount of copper disintegrate from the current collector due to the chemical interaction, and such a copper amount is freely distributed throughout the active material layers (See enlarged portion of FIGURE 2 below for a better visualization).*




As to claims 17-20 and 27:

JP'637 discloses a layered structure of the negative electrode comprising layers of different materials (FIGURE 2/Abstract). *Note that any one of those layers can taken as the surface coating layer.*

There is disclosed a conductive metal foil 11 such as a copper foil or copper alloy foil (Abstract).

**Note:** As to the method limitation, [i.e. "formed by electroplating, sputtering, CVD, PVD or rolling (claims 17-19); or formed of electrolytic metal foil (claim 27)], it is noted that a method limitation incorporated into a product claim does not patentable distinguish the product because what is given patentably consideration is the product itself and not the manner in which the product was made. Therefore, the patentability of a product is independent of how it was made. As a result, the process steps of a product-by-process claim do not impart any significant property or structure to the claimed end product. And, if there is any different, the difference

would have been minor and obvious. Determination of patentability of a product-by-process claim is based on the scope of the product itself.

*"[E]ven though product-by-process claims are limited by and defined by the process, determination of patentability is based on the product itself. The patentability of a product does not depend on its method of production. If the product in the product by process claim is the same as or obvious from a product of the prior art, the claim is unpatentable even though the prior product was made by a different process." In re Thorpe 777 F.2d 695, 698, 227 USPQ 964,966 (Fed Cir. 1985) and MPEP 2113.*

Thus, the present claims are anticipated.

## *Claim Rejections - 35 USC § 103*

17. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

18. The factual inquiries set forth in *Graham* **v.** *John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

19. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any

evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

20. Claim 21 and 25 are rejected under 35 U.S.C. 103(a) as being unpatentable over the Japanese publication JP 2002-260637 (herein called the JP'637) as applied to the immediately preceding claims, and further in view of Sato et al 6589690.

The JP'637 is applied, argued and incorporated herein for the reasons expressed above. However, the preceding reference does not expressly disclose the specific thickness and porosity of the current collector and slurry containing the active material applied to a current collector surface.

Sato et al disclose a secondary battery comprising a non-aqueous electrolyte (Abstract/COL 2, lines 50-60). Sato et al disclose the use of tin-based or silicon-based material for negative electrodes (COL 10, lines 13-30) and a collector being a conductive substrate of a porous structure made of copper, among other, wherein the thickness thereof is in the range of 5-20 μm (COL 8, lines 47-6). Sato et al further disclose that negative active material is prepared to form a slurry which is coated on both surfaces of a collector made of a porous copper foil current collector having a thickness of 15 μm and having a large number of pores 0.5 mm (500 μm) in diameter which are distributed at a ratio of 10 per 10 $cm^2$ (COL 47, lines 30-39 & COL 39, lines 42-52).

In view of the above, it would have been obvious to a person of ordinary skill in the art at the time the invention was made to make the current collector of the JP'637 by having the

specific thickness and porosity of the current collector and slurry containing active material applied to a current collector surface of Sato et al as Sato et al teach that disclosed technique and characteristics assists in providing an effectively uniformly coated current collector, and ensure a sufficiently high mechanical strength of the negative electrode while properly suppressing the weight of the negative electrode. With respect to the specific pore size and/or distribution, where the only difference between the prior art and the claims is a recitation of relative dimensions (*changes in size/proportion*) of the claimed feature and a feature having the claimed relative dimensions would not perform differently than the prior art device/element/member, the claimed device/element/member is not patentably distinct from the prior art device//element/member. That is, limitations relating to the size of the feature/element/member are not sufficient to patentably distinguish over the prior art as it is noted that changes in size is a matter of choice which a person of ordinary skill in the art would have found obvious absent persuasive evidence that the particular size of the claimed *pore* is significant. In re Rose 105 USPQ 237; In re Rinehart 189 USPQ 143; In Gardner v. TEC Systems, Inc., 220 USPQ 777 & 225 USPQ 232, **(See MPEP 2144.04 [R-1] Legal Precedent as Source of Supporting Rationale)**

21. Claim 26 are rejected under 35 U.S.C. 103(a) as being unpatentable over the Japanese publication JP 2002-260637 (herein called the JP'637) as applied to the immediately preceding claims, and further in view of Barriere et al 2002/0168569.

The JP'637 is applied, argued and incorporated herein for the reasons expressed above. However, the preceding reference does not expressly disclose the specific current collector.

In paragraph 0076 of Barriere et al, there is disclosed a metal collector made of metal foils or metal grids or metal foams made of copper, aluminum, nickel or metal alloys. These

metal substrates may possibly be treated so as to promote the adhesion of the films (0076). The disclosure of Barriere et al is directly related to a lithium-ion battery (Title/Abstract).

In view of the above, it would have been obvious to a person of ordinary skill in the art at the time the invention was made to use the specific current collector of Barriere et al in the negative electrode of the JP'637 because Barriere et al teaches that such a foam metal material provides the benefit of promoting adhesion of the film/layer of the active material. Thus, it improves the mechanical stability of the electrode structure.

## *Conclusion*

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Raymond Alejandro whose telephone number is (571) 272-1282. The examiner can normally be reached on Monday-Thursday (8:00 am - 6:30 pm).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Patrick J. Ryan can be reached on (571) 272-1292. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Raymond Alejandro/
Primary Examiner, Art Unit 1795